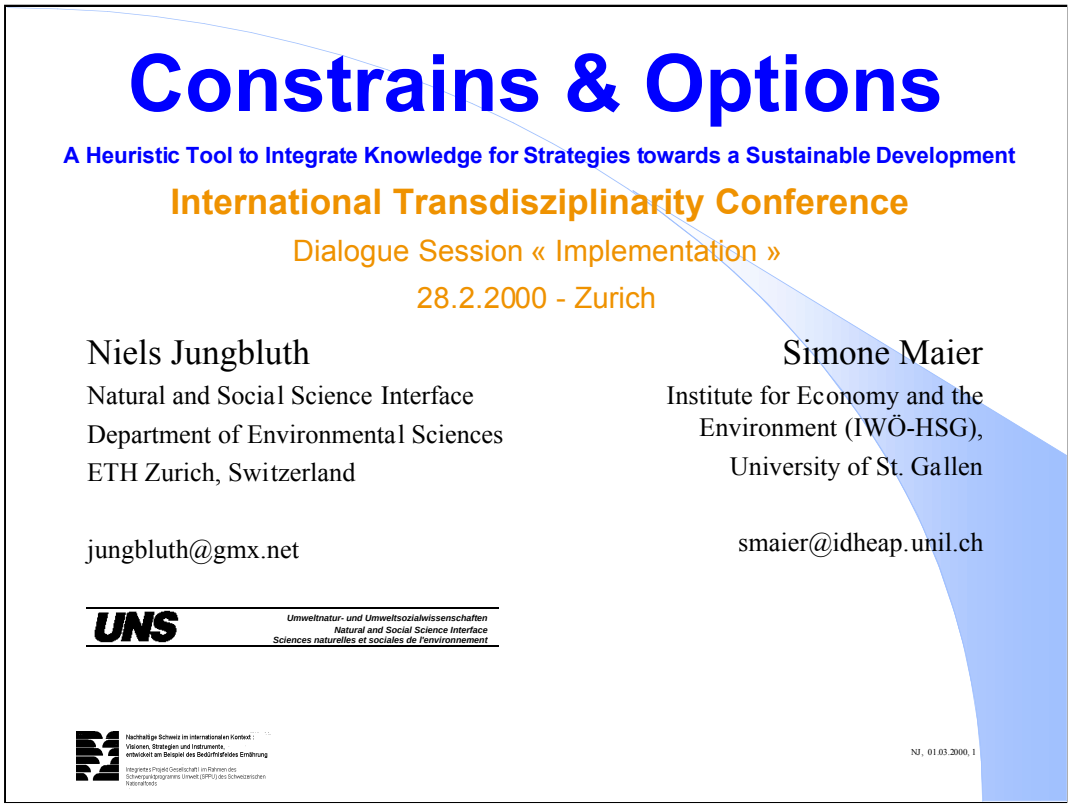


The possibilities for a sustainable development within the need field nutrition had been investigated in a four year period in the integrated project “Society” founded by the Swiss National Science Foundation. An important prerequisite for transdisciplinary research is a common understanding of research questions and goals. The working group ”constrains & options”, consisting of researchers from different disciplines, has developed a heuristic for the mutual analysis of the need field nutrition. We present here theoretical elements and practical experiences with this heuristic.

Niels Jungbluth
UNS, ETH Zentrum HAD F2
CH-8092 Zuerich
Tel: ++41 1 632 49 83 Fax: ++41 1 632 10 29
jungbluth@gmx.net
http://www.uns.umnw.ethz.ch/~jungblu/

Our presentation consists of the following parts:

First we present the analytical tools of the heuristic "constrains & options", (2) we show the results of the research co-operation between life cycle assessment and psychology in a "diary-study" with consumers and (3) we discusse the experience in mutual learning between academic research people and actors in the area of nutrition in a workshop (Restriktionen & Optionen 1999).

Research Partners of the Transdisziplinary Working Group

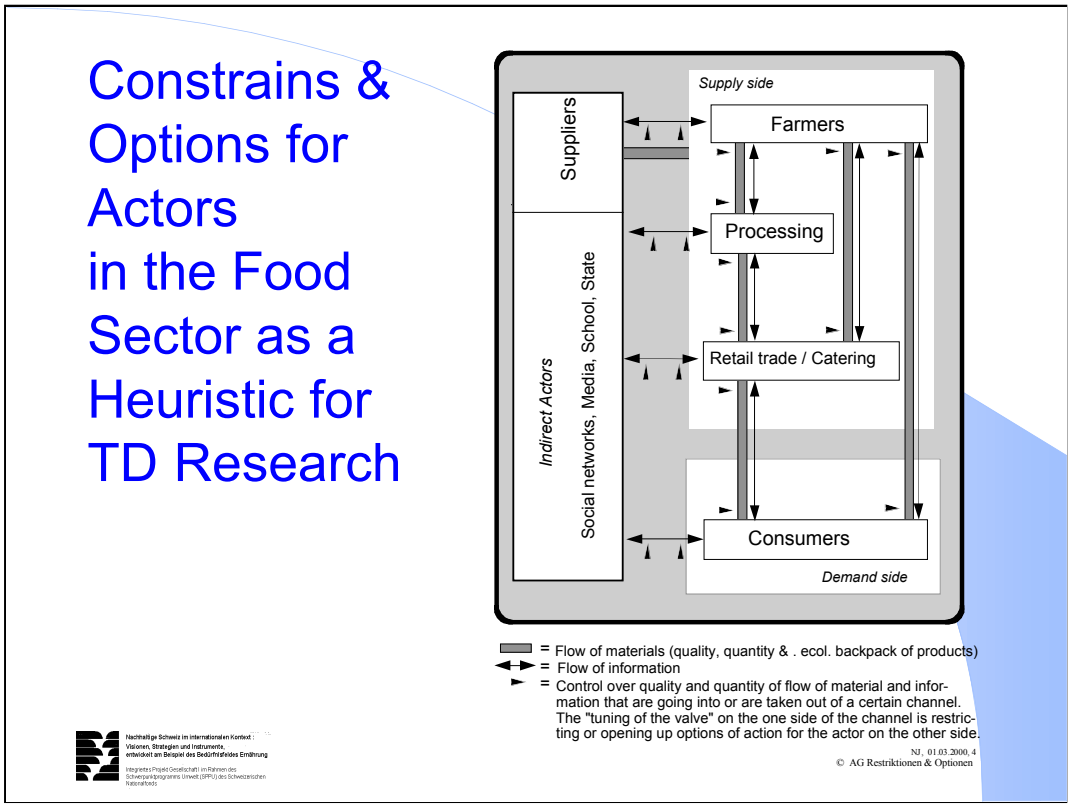
Research Project	Discipline	Institution
Ecological economic policy between selforganization and external control - "Inventions" against the blockade of environmental policy	Economics	Marc Mogalle, Tobias Schulz, IWÖ-HSG, University St. Gallen
Organizational and interorganizational learning and change processes towards a sustainable development	Organizational Theory and Business Administration	Simone Maier, IDHEAP, Lausanne
Education and public relations for a sustainable development in the Swiss area of alimentation	Education and Journalism	Gertrude Hirsch, ETH / Universität Zürich
Strategies and instruments for the support of ecological innovations on the regional level	Regional Sciences	Kurt Hofer, Ueli Stalder, Geographisches Institut, University Bern
Impeding and supporting conditions for the realization of social representations in everyday actions in the area of alimentation	Psychology	Carmen Tanner, Sybille Wölfing-Kast, Institut for Psychology, University Bern
Energy, greenhouse gases and way of living	Life-Cycle-Assessment	Niels Jungbluth, Natural and Social Science Interface, ETH Zürich

Nachhaltige Schweiz im internationalen Kontext: Visionen, Strategien und Instrumente, entwickelt am Beispiel des Bedürfnisfeldes Ernährung

Integriertes Projekt Gesellschaft im Rahmen des Schwerpunktprogramms Umwelt (SPPU) des Schweizerischen Nationalfonds

NJ, 01.03.2000, 3

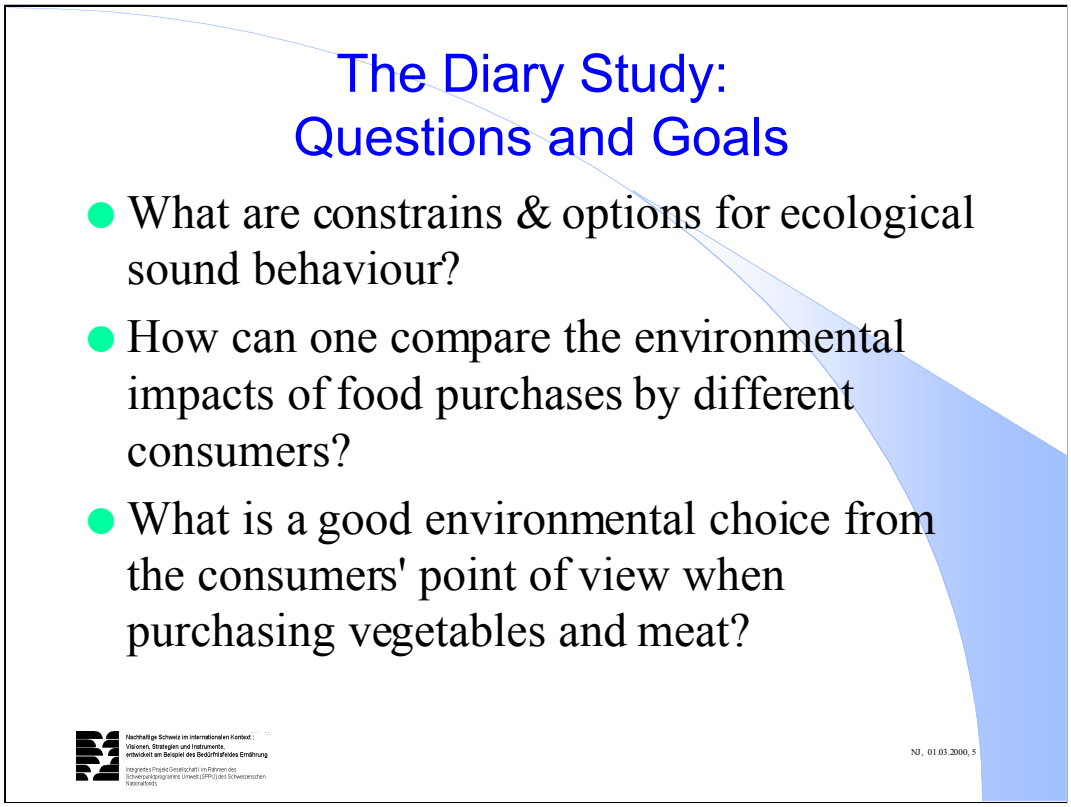
The heuristic tool "constrains & options" has been developed by members coming from different disciplines and different projects in the integrated project "Sustainable Switzerland in an International Context" of the SPP Environment (Restriktionen & Optionen 1998). Different partners from a range of research disziplines took part in the working group constrains & options. Most of them were from social sciences but some are also from natural science. Six out of nine different projects joined this working group.



The heuristic aims to analyse the factors, that restrict or support actors to follow sustainable ways of acting, which we call options and by which we mean ways of acting with preferable consequences in respect to ecology, social aspects and economy. By doing this, the heuristic is helpful to identify the potential and possible strategies of actors to change their ways of acting.

The heuristic is based on the "needs-approach", elaborated for the area of nutrition (Rigendinger 1997, Mogalle 1999), the social theory of Giddens (Giddens 1998, Schneidewind 1997), the so-called "Kanaltheorie" of Lewin (1982) and the theory of social representations by von Cranach (1992).

The heuristic shows the link of the flow of information, materials, products, and environmental impacts among the different actors. These flows are regulated by the constrains & options each actor faces. One research ooperation investigated the restricions and options for consumers while purchasing food products.



One of the research co-operation within the working groups was among psychologists and life cycle assessment practitioners. Our research addresses the following questions:

What are constrains & options for ecological sound behaviour?

What are the possibilities for an ecological behaviour from the consumers' point of view? The answer should consider all relevant stages in the life-cycle, it should show a range of environmental impacts relevant for this life-cycle and it should be simple enough to be communicated to consumers.

How far do consumers realise already an environmentally sound behaviour? How can impacts of their purchases be assessed in a scientific way? And which constrains for an ecological behaviour do different consumer subgroups face?

The Diary Study

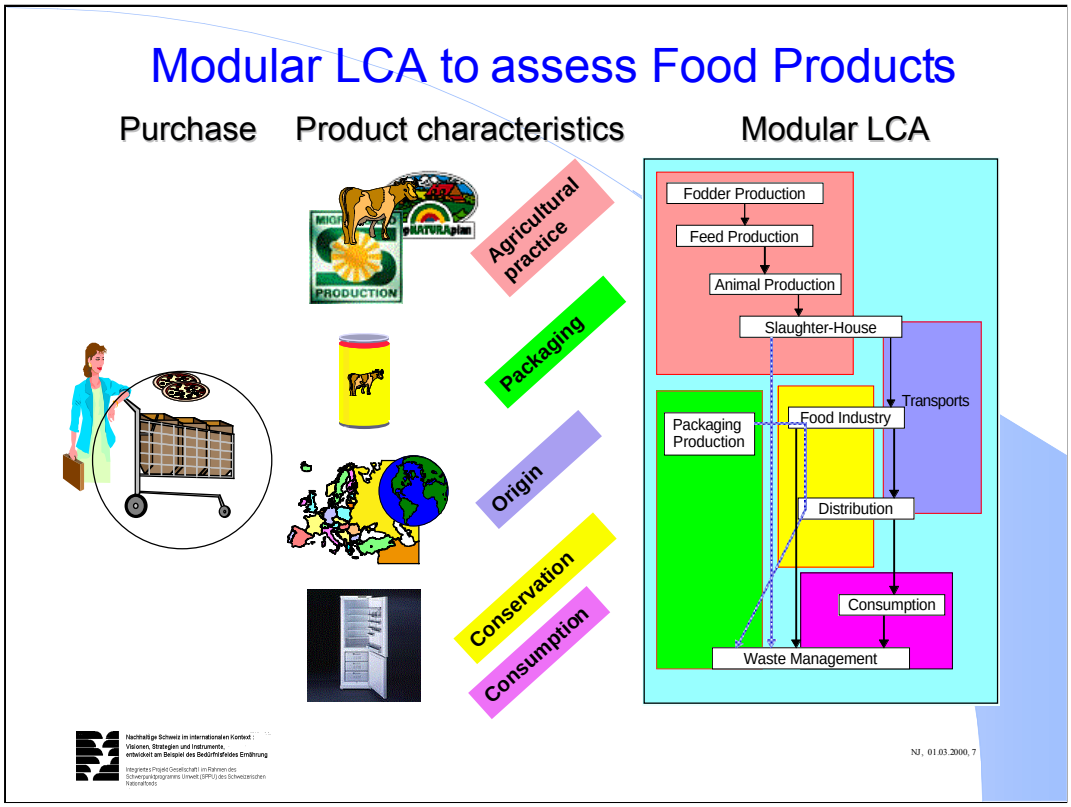
- About 100 consumers reported their food purchases and influencing factors (price, intended use, or type of shop) in detail over a period of 4 weeks
- The environmental impacts were quantified with a modular life cycle assessment (LCA)
- Psychologists identified constrains and options for environmentally sound behaviour

Nachhaltige Schweiz im internationalen Kontext : Visionen, Strategien und Instrumente, entwickelt am Beispiel des Bedürfnisfeldes Ernährung

Integriertes Projekt Gesellschaft im Rahmen des Schwerpunktprogramms Umwelt (SPPU) des Schweizerischen Nationalfonds

NJ, 01.03.2000, 6

The modular LCA has been developed for the assessment of purchases reported in diary study. Consumers from different subgroups reported the characteristics of their purchases according to the method developed. The survey ran over four weeks. It aimed at identifying constrains and options for environmentally sound behaviour by a group of psychologists.



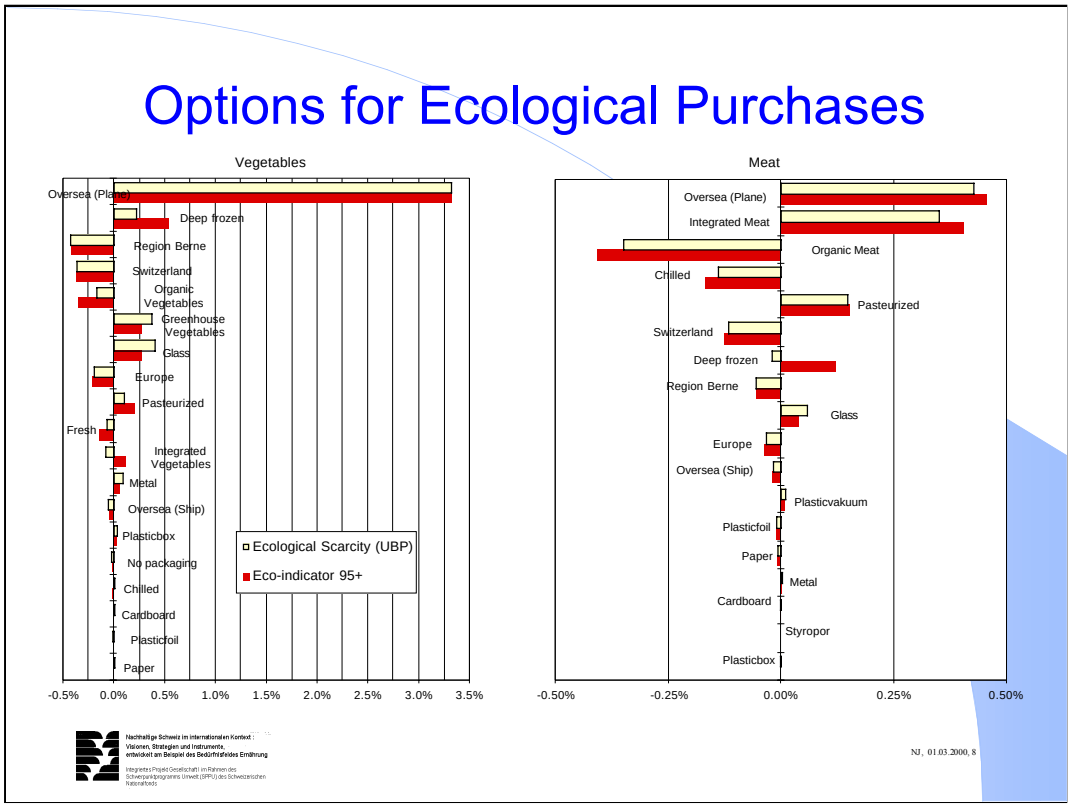
Now I come to the question of how to evaluate the environmental impacts for the diary study. Vegetables and meat had been chosen as the products to be investigated in detail.

It is impossible to calculate a separate LCA for each product which can be purchased in a shop. Thus in first step, the main product characteristics relevant for the environmental impacts have been identified. These are the type of agricultural practice, the packaging, the transport from the area of origin and the type of conservation. For a full life-cycle perspective consumption should be considered.

The figure shows the modular LCA approach as it has been developed within the research project. It is designed to match the important characteristics identified.

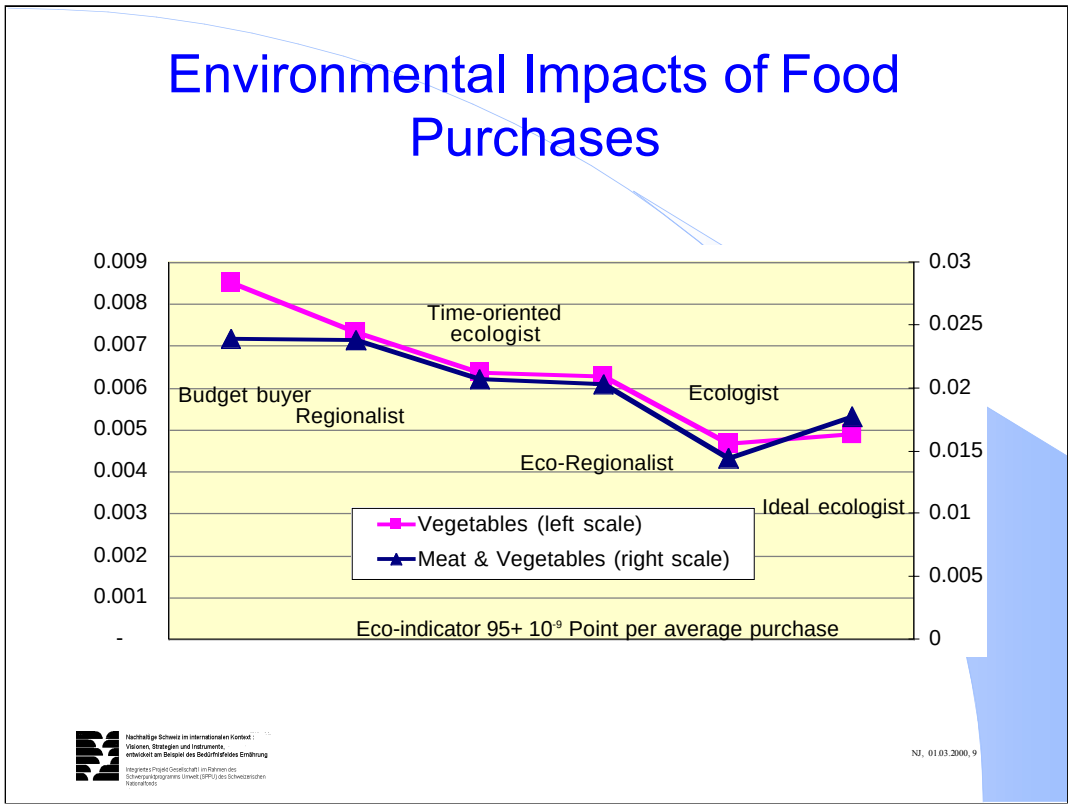
The module “packaging” distinguishes for example between different typical materials. The life-cycle-inventory considers the production and the waste management for the packaging necessary for one kilogram of product.

Five separate LCA’s have been performed for the characteristics of a range of food products. At the end the five single modules can be summed up to assess the total environmental burden of a product purchased.



Consumers will normally not buy the least polluting products only. However, they can adapt their behaviour and buy more of the environmentally friendly ones. Starting from the average purchases investigated in the diary study, different options for these changes have been compared. The figure gives the increase or decrease in environmental impact that results from demanding the indicated peculiarity of a characteristic 1% more. One can see from the figure that, e.g., if the share of organic products is increased by one percent, the average impact (valued with Eco-indicator 95+) of a vegetable purchase will decline 0.4%. It has been assumed here that the shares of the products with other peculiarities for this characteristic are changed accordingly. A peculiarity whose bar points to the right should be bought less in order to minimise the environmental impacts.

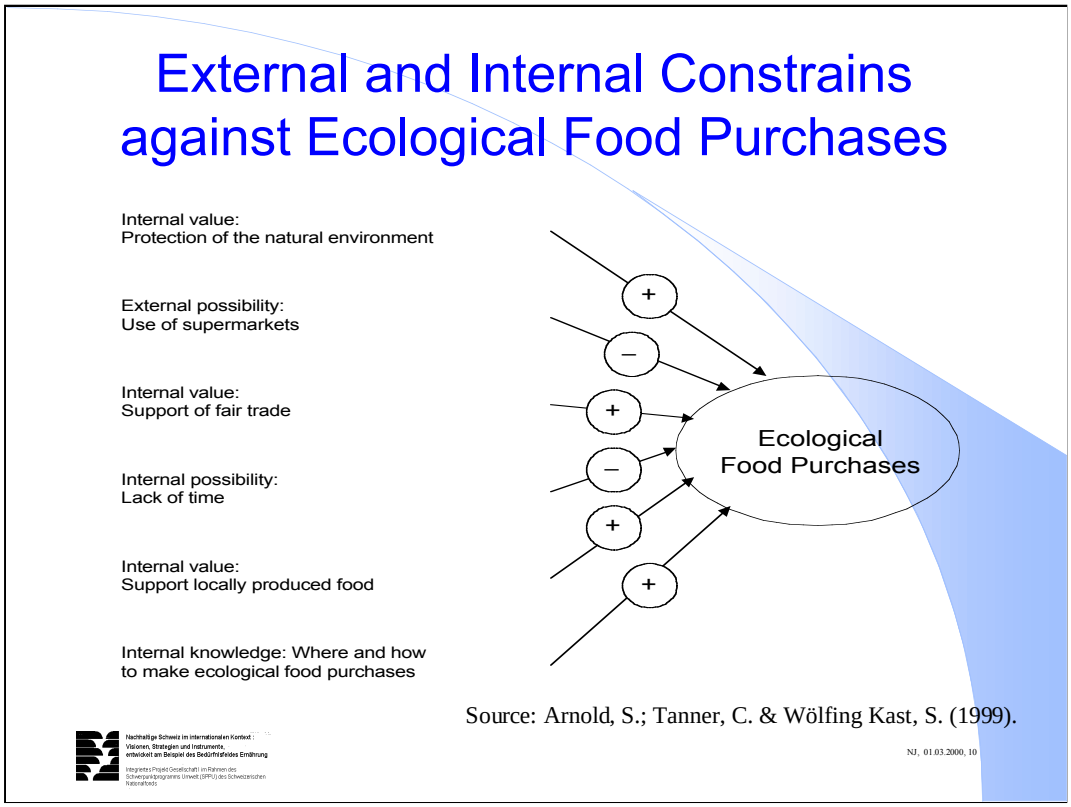
The change in environmental impacts resulting from a marginal change of purchasing patterns helps to rank the different recommendations for consumers. The figure can be read as a ranking list of the most important strategies for an environmentally sounder behaviour when purchasing vegetables or meat. The highest change for a meat or a vegetable purchase results from avoiding fresh products flown in from overseas. Less than 10% of the products bought by the consumers in our sample belonged to this category, but they account for over 80% of the environmental burden due to transportation.



The figure shows the impact of an average purchase by consumer subgroups in Eco-indicator 95+ points. On the left side is the scale for vegetable purchases. The right one shows the points for the total average of meat and vegetable buying. The following conclusions could be drawn from the diary study:

An average purchase of meat, of vegetables, or of both groups together has been chosen as the functional unit to compare the environmental impacts due to different consumption patterns. The figure shows the impacts for consumer subgroups expressed in Eco-indicator 95+ points. The scale for vegetable purchases is on the left side, the one for the total average of meat and vegetable buying on the right side.

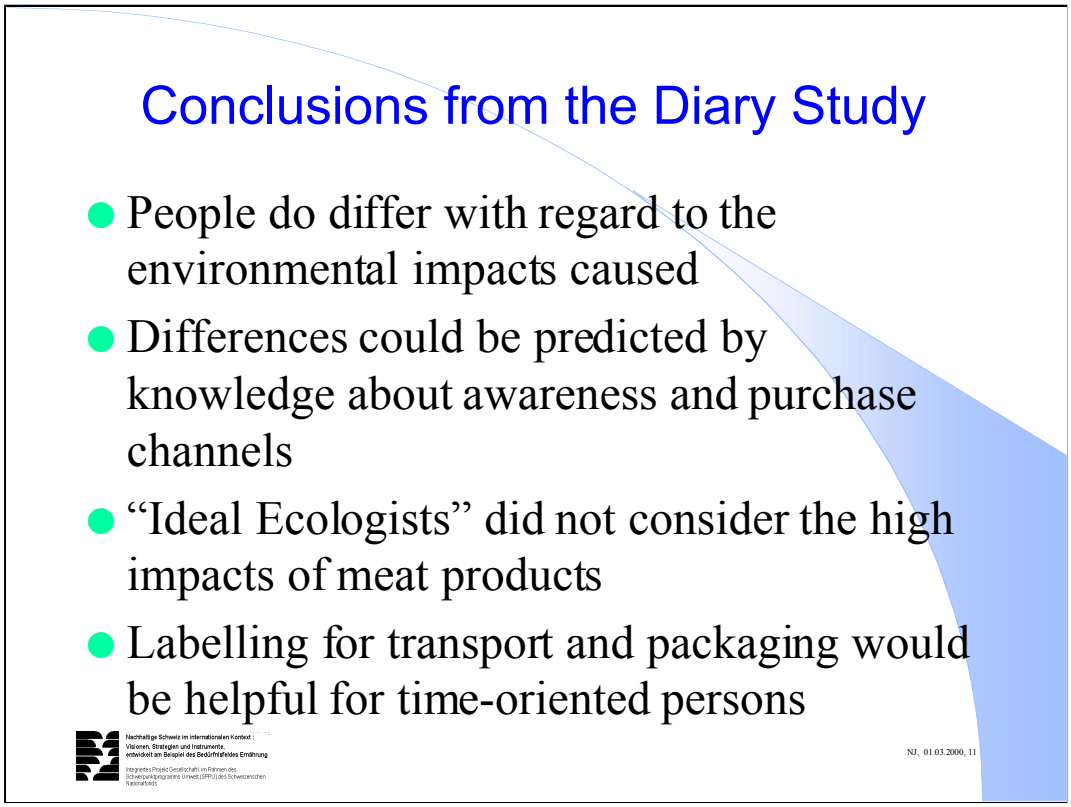
Persons belonging to different subgroups do definitely differ with regard to the environmental impacts caused by their purchases. The values of Eco-indicator 95+ points decrease from the consumer type called ”anti-ecologist” to the one named ”ecologist”. The comparison shows the predicted environmentally sounder behaviour of those consumers which tend to take the environment more serious, which have more knowledge, and which use environmentally sounder distribution channels. These consumers considered all the product characteristics and bought those products to a larger extent with the less polluting peculiarities. But, the detailed analysis reveals some constraints on environmentally sound behaviour.



Members of the subgroup that is short of time only look at product labels and thus sometimes buy the environmentally more polluting products. Integrated labelling for transport and open air production would be helpful for these time-oriented persons. It is surprising that the impacts of an average purchase for the ”ideal ecologist” are a little bit higher than for the ”ecologist”. This is due to the higher amount of meat products purchased by this subgroup even though these consumers buy meat with an organic label to a larger extend than these from other groups. This type of consumer may switch to a more vegetarian diet in order to reduce the environmental impact.

The joint research of psychologists and natural scientists for the diary study helped to identify constrains and options for an ecological behaviour. The heuristic was a useful instrument for a mutual learning between the different disciplines. Life cycle assessment helped to characterise the environmental impacts and to outweigh the impacts of different options for purchases. The psychologists knew how ask the right questions and brought in a view on the possibilities of consumer how to judge the environmental impacts of their purchases.

The psychologists could identify the factors influencing the degree of ecological food purchases.



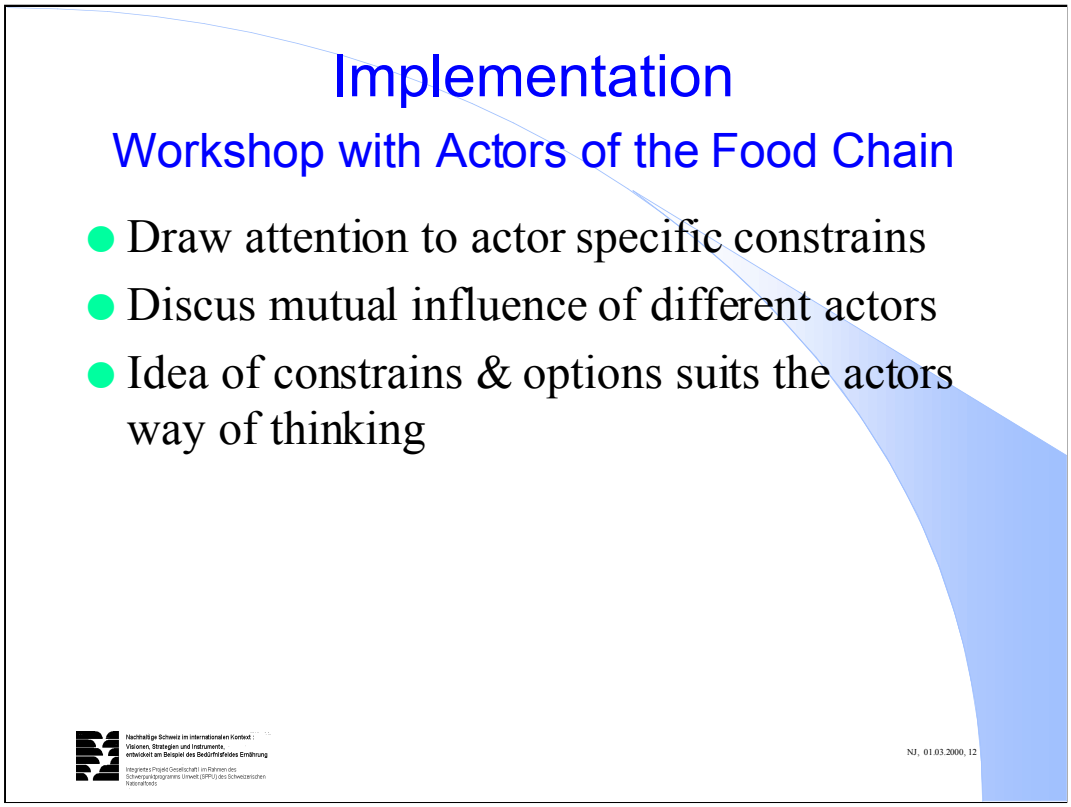
The following conclusions could be drawn from the diary study:

People from different subgroups do differ with regard to the environmental impacts caused.

Differences could be predicted to some extend by knowledge about their environmental awareness and purchase channels.

The subgroup which is short of time only looks on labels and thus buys sometimes environmental more polluting products. Labelling for transport, open-ground and packaging would be helpful for these time-oriented persons.

“Ideal Ecologists” buy a little bit more meat products. Even with a high share of these products from organic production this leads to a rise of average impacts due to the high impacts of animal production. This type of consumer may switch to a more vegetarian diet.

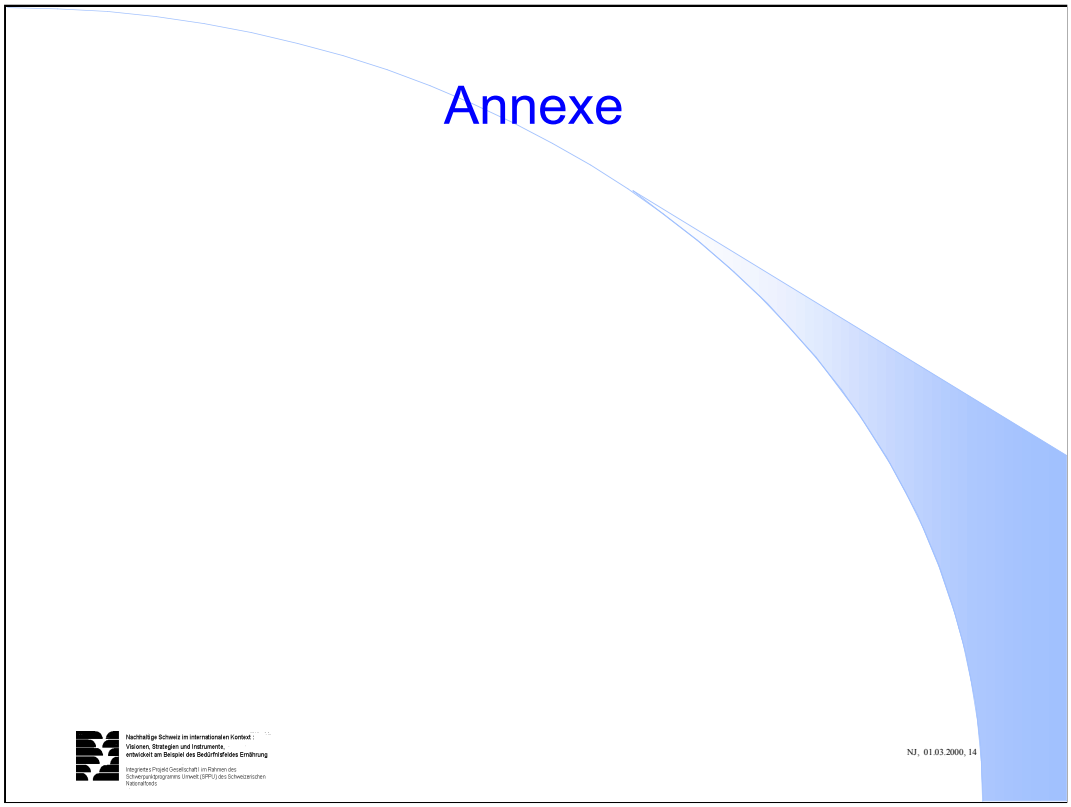


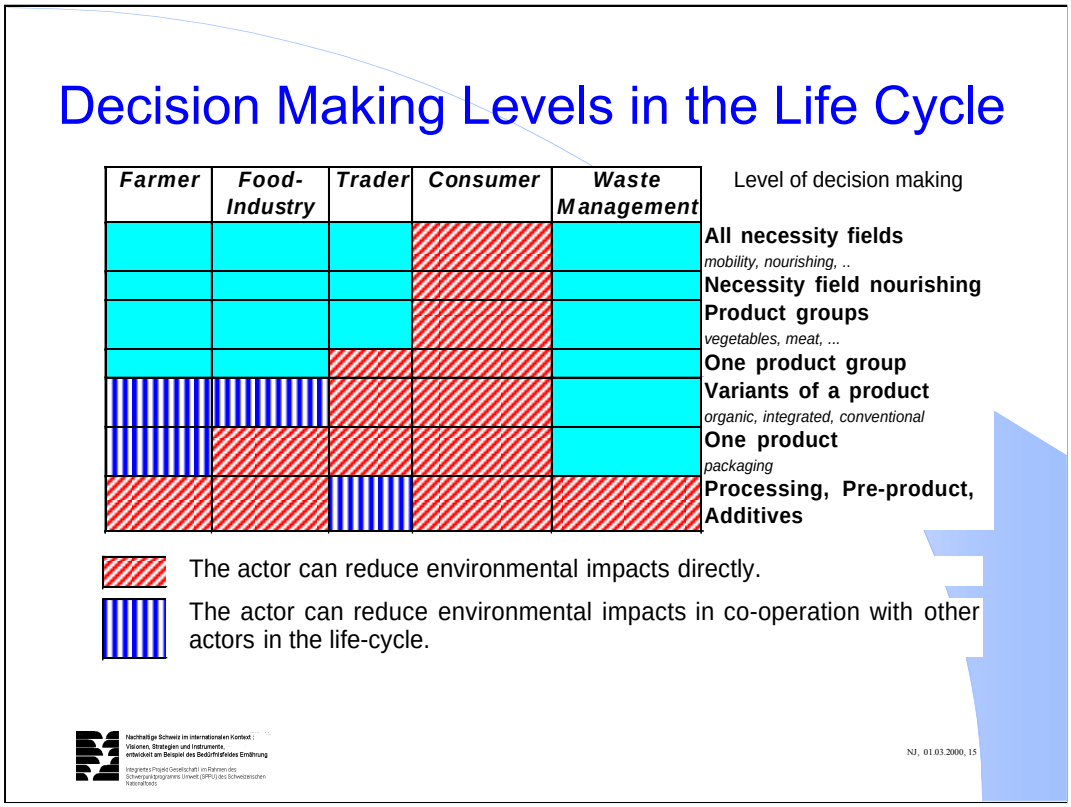
In workshops with actors from different parts of the product chain we discussed some strategies how consumers can be supported at the point of sale in order to buy more environmentally sound products. The most important strategies were: embedding the presentation of ecological products into an overall sales and image strategy, e.g. the promotion of a healthy way of life, a shift from relative to absolute price margins, a presentation of ecological products in prime positions in the shops, as well as a strong communication of the ecological surplus, using well-established labels and stressing the origin of the products.

On the supply side rather internal constrains have to be overcome that stem from the co-evolution of organisational structures along with the use of conventional products. This starts with the expectations that purchase and production workers have about product quality and availability and it ends with the cost and quality management systems that set rules which ecologically sound products cannot fulfil if they have to maintain certain ecological standards. But changing well established organisational rules is the more difficult the less ecological products are rooted within the overall organisation's strategy, the smaller the share of ecological products is compared to that of the conventional product range, and the less the ecological products fit with the conventional product range's image.

Conclusions
for Transdisziplinary Research

- A common heuristic supports transdisziplinary research
- Mutual learning should not be to theory biased
- Common goals help to drive forward research cooperations


Annexe
Nachhaltige Schweiz im internationalen Kontext :
Visionen, Strategien und Instrumente,
entwickelt am Beispiel des Bedürfnisfeldes Ernährung
Integriertes Projekt Gesellschaft im Rahmen des
Schwerpunktprogramms Umwelt (SPPU) des Schweizerischen
Nationalfonds
NJ, 01.03.2000, 14

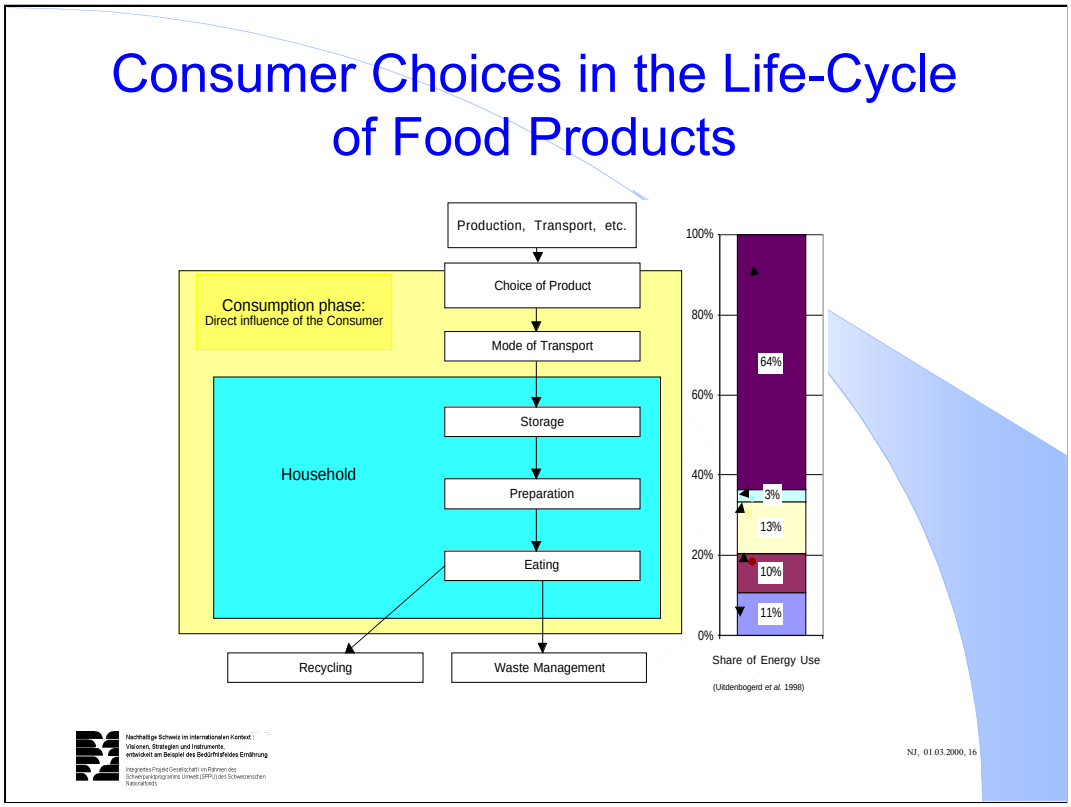


First of all I will give a look on the decision possibilities of different actors in a life-cycle of a product. This chart shows the possibilities of different actors in so called levels for environmental relevant decisions.

One can decide to shift money from one necessity field (e.g. mobility, transport) to another. This might be environmental relevant if one spent for example not much for travelling and more for collecting stamps. Within the necessity field nourishing one can decide for example to eat more outside or to live with a special diet. Nearby is the level of decision among different product groups (vegetables, meat). In one product group one can choose to buy more apples or more bananas.

Similar are decision within one product category (e.g. cabbage) with different products. More relevant for consumers are often choices among variants of a product (e.g. organic or conventional grown carrots). If the decision has been made for one product there is still the choice e.g. for a certain packaging which might be relevant. The consumer can also decide about the processing (e.g. cooking) of a product in the household and the energy use due to this. Decisions about Pre-products or Additives are mainly relevant for the producing or processing actors.

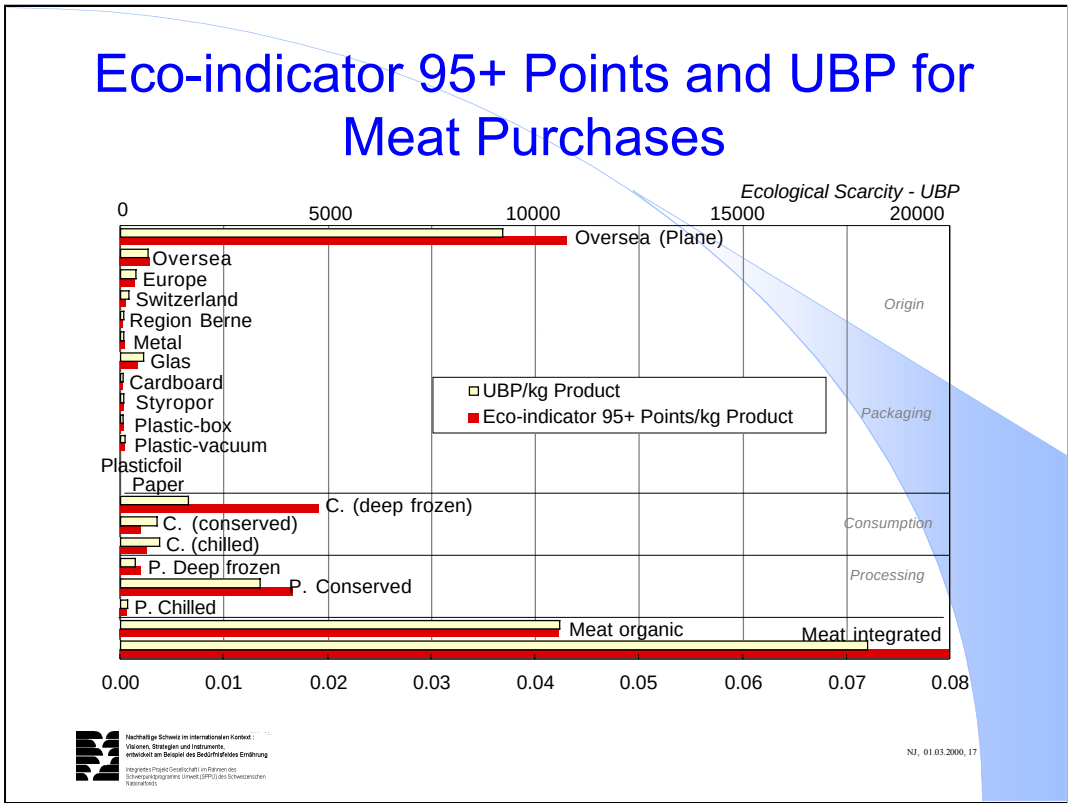
Consumers do have the widest range of possibilities to behave environmentally sound. From now on I will focus only on their decisions between different product groups and categories. We choose meat and vegetables for this assessment as examples in the necessity field of nourishing.



The following figure illustrates the possible decisions from a consumer's point of view in a life-cycle perspective. A first choice is to look at the energy use in different stages in the life-cycle of average food consumption. About two thirds energy use arise already during the production of the food until it reaches the shopping basket of the consumer. About one fourth of it takes directly place during the consumption phase. At the end the consumer makes a decision about the waste management for packaging or food wastes.

The graphic shows that it is very important to look at the production stage when discussing the environmental impacts due to food consumption.

Different levels of decision making exist for the consumer while judging the impacts of production. One can choose for example between a normal and a vegetarian diet. Or the consumer can try to buy products with the most environmentally friendly packaging material.



This figure now shows the results for the modules investigated for the purchases of meat. All figures give the environmental impacts for one kilogram of product purchased in the shop. The left scale shows Eco-indicator 95+ points and the right one the valuation with the ecological-scarcity method. The Eco-indicator 95+ and Ecological Scarcity are two methods to summarise all environmental impacts to one single indicator.

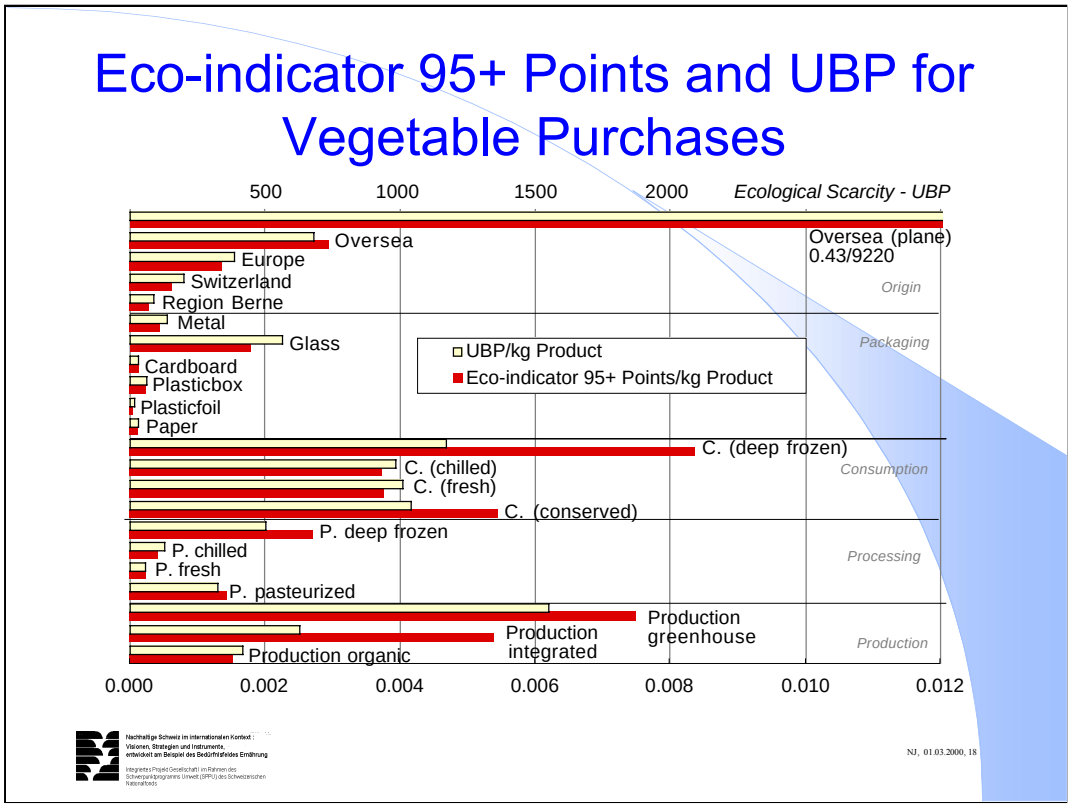
The two impact assessment methods do not differ much as to the general messages for meat products:

•The overall impact is dominated by the agricultural production.

•There are large differences between different types of meat. A point which would be valuable to assess in a full LCA, because from a top-down assessment it does not seem to make sense to produce more pork instead of meat from grassing animals in Switzerland. The LCA does not consider the amount and type of land available in reality for different types of animal production..

•Transportation might be important if the product is flown in from America or New Zealand.

•Packaging, conservation and consumption are of low importance.

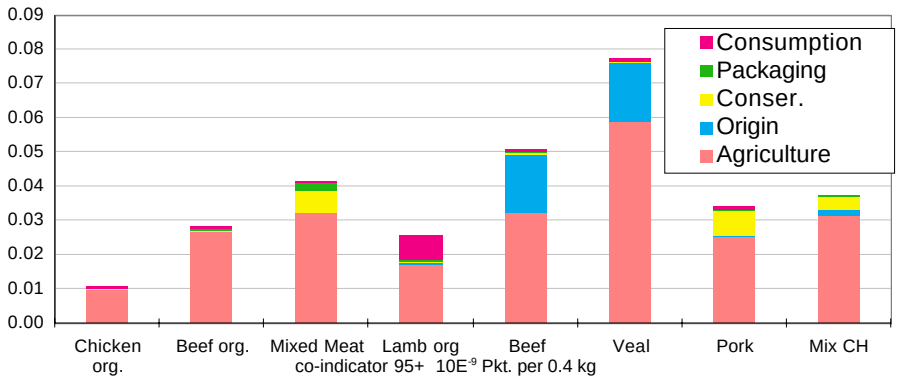


The following slide shows comparable results for vegetables. In this case all characteristics might have a relevant contribution to the environmental impacts of a purchase.

Differences arise from the type of production. Greenhouse products show considerable higher impacts than open-ground production. Organically grown vegetables show the lowest impacts.

Four types of conservation and origin have been distinguished in the survey. Especially deep-freezing leads to higher impacts for the conservation and during the consumption stage. Transports might be relevant even for products from within Europe. The origin dominates the result for flown-in vegetables. Packaging is of minor importance, with the exception of glass that is an option with comparably high impacts.

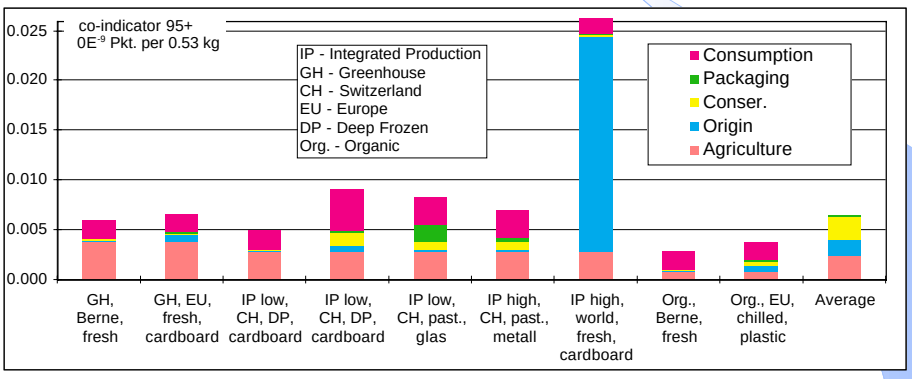
Accumulated Results for Meat Purchases



This figures shows the summed results for theoretical possible purchases of meat products. The Eco-indicator points calculated can be multiplied with the purchases' weight and than summed up to assess the overall impact of a purchase.

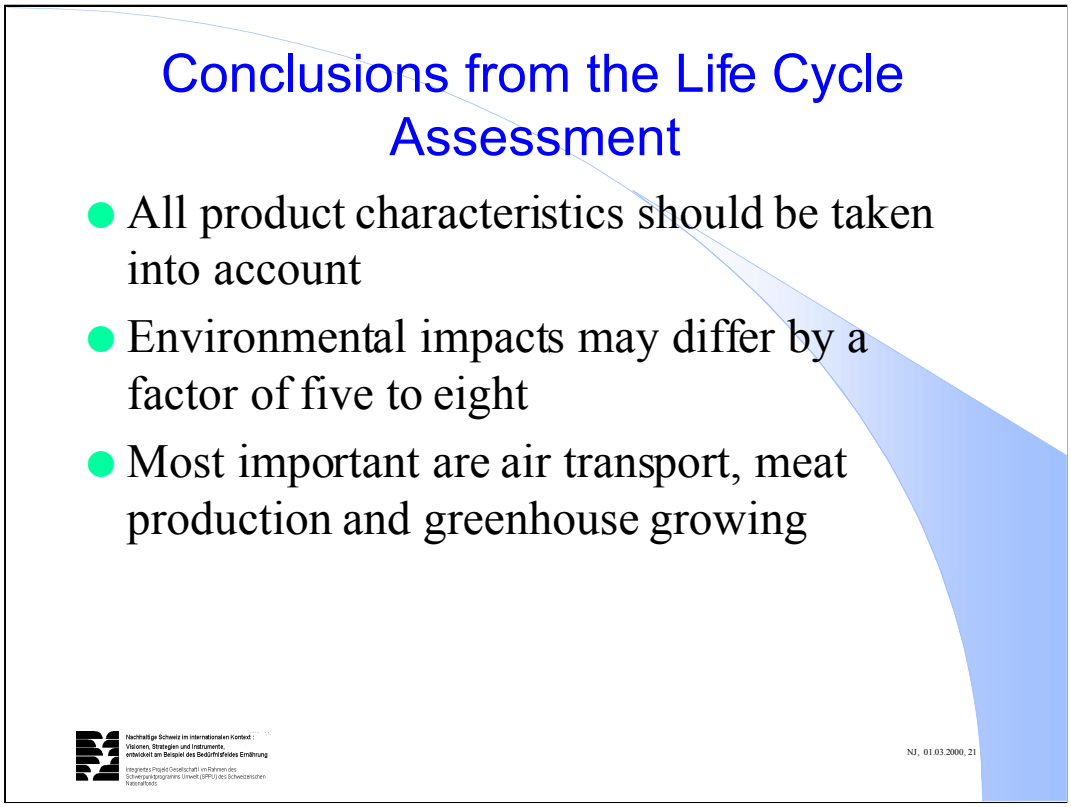
High differences exist between the products with the lowest and the highest environmental impacts. Purchases of a certain amount of meat may differ by a factor of eight in the environmental impacts caused.

Accumulated Results for Vegetable Purchases



The following figure shows the summed results for theoretical purchases of vegetable products. Also here differences exist. The highest impact shows a product flown in from oversee. But also products from Europe may differ by a factor of two in the environmental burden caused. Differences are caused mainly by the type of production and due to the high environmental impacts of deep frozen products stored for some time in the household.

There is no one strategy to be environmentally sound. Thus for example an organic product from Europe might cause higher impacts than one from integrated production in the region.



The Eco-indicator points calculated can be multiplied with the purchases' weight and then summed up to assess the overall impact of a purchase. The following conclusions can be drawn from the modular LCA:

Large differences exist between the products with the lowest and the highest environmental impact. Purchases of a certain amount of meat may differ by a factor of eight in the environmental impacts caused.

The highest impact for vegetable purchases is due to a product flown in from overseas. But also products from Europe may differ by a factor of two in the environmental burden.

For vegetables and meat, packaging is of minor importance. But, results for one product group do not hold true for another product group with another life-cycle.

All product characteristics must be taken into account while judging the environmental performance. Some of the environmentally important product characteristics are not easy to assess by the consumers. These characteristics should be declared on the product packaging or may be integrated in existing guidelines for labels.

Types of Consumer

	Typ I	Typ II	Typ III	Typ IV	Typ V	Typ VI
Umweltschutz	unwichtig	unwichtig	wichtig	unwichtig	wichtig	wichtig
Soziale Gerechtigkeit	unwichtig	unwichtig	wichtig	unwichtig	wichtig	wichtig
Regionale Produkte	unwichtig	wichtig	wichtig	wichtig	wichtig	wichtig
Zeitersparnis	notwendig	nicht notwendig	notwendig	nicht notwendig	nicht notwendig	nicht notwendig
Ökolog.Handlungswissen	gering	gering	mittel	mittel	hoch	hoch
Ökolog. Einkaufen	**tief**	**tief**	**mittel**	**mittel**	**hoch**	**hoch**
Bevorzugte Einkaufskanäle für Fleisch (f), Milch (m), Gemüse (g)	f: Gross m: Gross g: Gross, Markt	f: Spez, Gross m: Gross, Spez g: Gross, Markt	f: Gross m: Gross g: Gross, Markt	f: Spez, Gross m: Spez g: Spez, Markt, Gross	f: Spez, Bio m: Gross, Spez g: Markt, Bio, Gross	f: Spez, Bio m: Spez, Bio g: Bio, Spez, Markt

Gross = Migros und Coop; Spez = Spezialgeschäft/Quartier, Dorfladen; Markt = Markt; Bio = Bioladen/Biobauer

Hemmende Bedingungen ökologischen Einkaufens

Fördernde Bedingungen ökoloischen Einkaufens

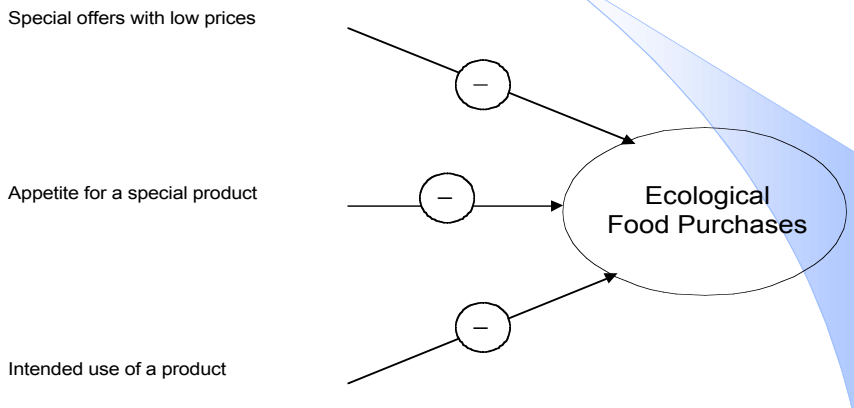
Nachhaltige Schweiz im internationalen Kontext: Visionen, Strategien und Instrumente, entwickelt am Beispiel des Bedürfnisfeldes Ernährung

Integriertes Projekt Gesellschaft im Rahmen des Schwerpunktprogramms Umwelt (SPPU) des Schweizerischen Nationalfonds

NJ, 01.03.2000, 22

Für die Auswertung des psychologischen Teilprojektes wurden 6 Konsumententypen unterschieden. Diese Unterscheidung stützt sich auf Erhebungen im Fragebogen. Dabei wurden unterschiedliche Einflussfaktoren gewichtet.

Situational Constrains against Ecological Food Purchases



Source: Arnold, S.; Tanner, C. & Wölfing Kast, S. (1999).

The diary study helped to identify situational restrictions against ecological food purchases.